Evaluation of nutritional adequacy of families in three districts of Andhra Pradesh in post-pandemic period

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ABSTRACT

Present study was undertaken to determine the nutritional adequacy of families in three districts of Andhra Pradesh in the post-pandemic period in the year 2021-2022. The study comprised 360 families covering both urban and rural areas in the three selected districts. Nutritional status was assessed in people in post-pandemic period by taking anthropometric measurements and 24-h dietary recall method. The percentage adequacy of both macro and micronutrients was assessed. The nutrients assessed were energy, carbohydrate, protein, fat, vitamin C, iron and calcium. The results indicated that the intake of nutrients was above the recommended allowances in case of fat and energy and below the recommended allowances for carbohydrate, protein, vitamin C, iron and calcium. In 30 per cent of the members who followed health conscious diet chart in post-pandemic period due to fear of dreadful pandemic situation, the body mass index (BMI) was found to be in normal limit. The nutritional status of majority of the members showed overweight or obese mainly for the reasons like irregular dietary timings, overeating habits and sedentary lifestyle. Of course, a small percentage of the subjects recorded underweight too because of non-consumption of nutritious food due to financial constraints.

Keywords: Nutritional adequacy; post-pandemic period; anthropometry

INTRODUCTION

Nutritional adequacy is defined as the sufficient intake of essential nutrients, needed to fulfill nutritional requirements for optimal health. According to the criterion of adequacy defined, the requirement for a given nutrient may be at a lower or higher intake amount. The criteria that are generally used to define adequacy of intake are: the prevention of deficiency diseases, the prevention of chronic diseases or the reduction of risk for diet associated diseases, subclinical nutritional health conditions identified by specific biochemical or functional measures or requirements to maintain physiological balance (Dhonukshe-Rutten et al 2013).

Nutritional adequacy compares the nutrient requirement with the intake of nutrients at individual or population levels. As neither the real intake nor the real requirement for one individual is known, the assessment of nutrient intake adequacy of an individual or population is based on the probability of adequacy (Román-Viñas et al 2009). Nutritional adequacy determines the risk of low or high intakes. Excess salt (sodium) consumption is associated with multiple adverse health outcomes including a positive causal relationship with blood pressure (Aburto et al 2013).

Finding a dietary pattern, that fulfils the nutritional requirements of a population, is essential. Household food insecurity is defined as a serious

problem that occurs when households have inadequate food due to economic constraints.

The global burden of disease stated that dietary habits represent the second risk factor that leads to mortality and disability in the world (Anon 2017). Coronavirus disease 2019 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a novel coronavirus, that is responsible for the current pandemic threatening global public health (Rothan and Byrareddy 2020).

Since the outbreak of COVID-19 in December 2019, many countries declared self-quarantine and lockdowns to fight against the virus. These measures and restrictions negatively impacted the economy and forced people to change their lifestyle, which led to financial and psychological stresses (Carroll et al 2020, Park et al 2020, Arora and Grey 2020).

These measures had a significant repercussion on health and well-being that altered the lifestyle behaviour of people in terms of diet and physical activity.

The negative or positive habits that were adopted by the people during lockdown period were due to individual factors such as motivation, intention or mental state, socio-demographic factors such as age, gender, employment status or family responsibilities as well as environmental factors such as access to healthy foods or fitness facilities. Many of these potential factors were disrupted by the COVID-19 pandemic (Verhoeven et al 2015, Sinha 2018, Arora and Grey 2020, Pellegrini et al 2020).

In a study conducted by Yadav et al (2022), it was found that percentage of malnutrition observed in elderly population was significantly higher among COVID-affected people than non-affected people. Further, males suffered more than females in terms of malnutrition during and in post-COVID period (Yadav et al 2022). Anthropometric measurements, which are non-invasive quantitative measurements of the body, are used in the adult population to assess health, dietary status and future risk of disease.

The core elements of anthropometry are height, weight, head circumference, body mass index (BMI), body circumferences to assess for adiposity (waist, hip and limbs) and skinfold thickness. A balanced diet increases immunity, prevents inflammation and promotes weight gain to battle against infections (Weger-Lucarelli et al 2018, Jayawardena et al 2020, Muscogiuri et al 2020, Dhar and Mohanty 2020, Aman and Masood 2020, Calder 2021).

METHODOLOGY

The study was conducted in three districts of Andhra Pradesh. Three districts selected were Vishakhapatnam, Krishna and Chittoor, which lie in the northeastern, southeastern and southern regions respectively in Andhra Pradesh. These three districts were selected because among these three districts, two were pilgrim centres and the third one was a tourist centre. An ex post-facto research design was adopted for the study. A stratified sampling technique was used to select the samples from both rural and urban areas. Thirty families each from urban and rural areas were studied. Thus the total sample selected consisted of 180 families from urban and 180 families from rural area. In the 360 selected families there were 1,231 members.

The consent of the families was obtained for participating in the investigations by explaining the aim of the study. The complete research protocol was presented to the Institutional Human Ethics Committee (IHEC) of the university and approval was obtained before initiating the investigations.

Anthropometric measurements like height and weight of the respondents were taken and BMI was calculated. Height was measured using flexible measuring tape and analogue weighing balance was used to measure weight. The values of height (m) and weight (kg) were used to calculate BMI.

For assessing the nutritional status of family members in the post-pandemic period, 24-h recall method was used to collect data on food consumption. The data thus collected were analysed for nutritional adequacy of macro and micronutrients, including energy, carbohydrate, protein, fat, vitamin C, iron and calcium. The nutrient intake per consumption unit (CU) of the family was compared with recommended dietary allowances (RDA) for Indians, given by Indian Council of Medical Research. Percentages and two sample t-tests assuming equal variances were used to calculate the nutritional adequacy of selected families in all the three districts selected.

RESULTS and DISCUSSION

The distribution of family members according to age and gender is presented in Table 1. Majority of the family members (75.87%) were in the age group of 19 to 64 years and there were more women (59.38%) compared to men (40.62%).

Anthropometric data of 360 families consisting of 1,231 members in terms of height, weight and BMI are presented in Table 2. The height of 92.36 per cent of the members was in the range of 140 to 180 cm, while 7.64 per cent of the members were taller than 180 cm. Weight of 54.18 per cent of the members was above 65 kg while weight of other 44.35 per cent of the members was in the range of 26 to 65 kg. Data on BMI indicate that 29.89 per cent of the members had normal BMI, while 24.78 and 36.39 per cent were overweight and obese respectively. The members who had normal BMI status stated that they were following health conscious diet chart in post-pandemic period due to fear of dreadful pandemic situation. The reasons stated for presence of overweight and obesity were hormonal imbalance, hereditary causes, irregular dietary timings, over-eating habits and sedentary lifestyle. Around 9 per cent of the members who were underweight with BMI below 18.5 kg/m^2 mentioned that due to financial constraints they were unable to consume nutritious food. Loukrakpam et al (2020) conducted basic anthropometry and 24-h dietary intake assessment on the children, adolescents and women of reproductive age (WRA) in 12 villages belonging to Meitei community of the northeastern state of Manipur. The prevalence of underweight was 27 per cent, stunting 45 per cent and wasting 12 per cent in children below 5 years. Stunting was observed among 34 per cent children of 5-17 years of age. About 7 per cent of WRA were undernourished, while 28 per cent were

Table 1. Distribution of family members according to age and gender

Parameter	Members (n = 1231)	
	Number	Percentage
Age (years)		
10 to 18	130	10.56
19 to 64	934	75.87
65 and above	167	13.57
Gender		
Male	500	40.62
Female	731	59.38

Table 2. Distribution of family members according to height, weight and BMI

Parameter	Members (n = 1231)	
	Number	Percentage
Height (cm)		
140 to 180	1,137	92.36
>180	94	7.64
Weight (kg)		
11 to 25	18	1.46
26 to 54	219	17.79
55 to 65	327	26.56
>65	667	54.18
Body mass index (BMI) (kg/m^2)		
<18.4 (underweight)	110	8.94
18.5 to 22.9 (normal)	368	29.89
23.0 to 24.9 (overweight)	305	24.78
25 and above (obese)	448	36.39

overweight or obese. In the present study too the distribution of adult members in the categories of underweight, normal, overweight and obese showed similar results.

The results of 24-h dietary recall method are presented in Table 3 in terms of actual nutrient intake of nutrients per consumption unit (CU). The actual intake of nutrients including energy, carbohydrate, protein, fat, vitamin C, iron and calcium was compared with RDA and the per cent adequacy of nutrient consumption.

The data show the adequacy of 104 and 162 per cent for consumption of energy and fat respectively and adequacy of 94, 80, 69, 53 and 33 per cent for consumption of carbohydrate, calcium, protein, iron and vitamin C respectively.

The data related to statistical analysis for significance of difference in actual nutrient consumption and recommended allowances are presented in Table 4. It was found that the nutrient intake was significantly more than the recommended allowances for energy and fat and the consumption was significantly less than the recommended allowances for carbohydrate, calcium, protein, iron and vitamin C.

Other studies that were conducted during pandemic and post-pandemic periods reported about 55 per cent mean probability adequacy for vitamin C and iron while very low adequacy for vitamin A, vitamin E and calcium. Dietary determinants such as low dietary diversity scores, low intake of food groups other than sugars, fish, sea foods, spices and condiments lead to micronutrient inadequacy (Loukrakpam et al 2020, Kapoor et al 2023). Thus a high risk of nutritional inadequacy prevailed in all people, especially for micronutrients. As far as the macronutrients are concerned, inadequacy was observed for protein but not for fat and energy. This could be because snacking with junk or empty calorie recipes was most common during the lockdown days of COVID pandemic period.

CONCLUSION

It can be concluded that nutritional status of majority of people in post-pandemic period was inclined towards obesity, mainly due to a significant increase in the consumption of fat. Several factors such as staying indoors for long hours, relaxation from work stress and opportunity for more family time can be attributed for the presence of overweight and obesity in the population. The study also reiterated a state of health consciousness in people and a shift towards more healthy and immune boosting diets.

Table 3. Nutrient intake and per cent adequacy of the family members

Component	Actual intake/CU	RDA/CU	Difference	Adequacy (%)
Energy (kcal)	2,185	2,110	+75	104
Carbohydrate (g)	297	316	−19	94
Protein (g)	73	106	−33	69
Fat (g)	76	47	+29	162
Vitamin C (mg)	26	80	−54	33
Iron (mg)	10	19	−9	53
Calcium (mg)	802	1000	−198	80

Table 4. Test of significance between actual consumption and recommended allowances of nutrients

Component	Energy (kcal)	Carbohydrate (g)	Protein (g)	Fat (g)	Vitamin C (mg)	Iron (mg)	Calcium (mg)
Population mean	2,110	316	106	47	80	19	1,000
Sample mean	2,185	297	73	76	26	10	802
STDEV	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Variance	0.25	0.25	0.25	0.25	0.25	0.25	0.25
t-stat value	−183.7	46.5	80.8	−71.03	132.27	22.04	484.9
t-critical value 5%	2.77	2.77	2.77	2.77	2.77	2.77	2.77

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